

RECOMMENDED MIXING EQUIPMENT FOR Fish Oil Supplements

APPLICATION SUMMARY:

Fish oil supplements are popular sources of Omega-3 fatty acids which are linked to many health benefits. Many of these supplements are in the form of emulsions filled into gel capsules. Vitamin E or other antioxidants are typically added to improve stability and shelf life. Other fish oil-based supplements are emulsions that include gums, coloring, flavors and other additives.

This bulletin describes several high shear mixing technologies utilized in the production of fish oil and fish oil-based supplements. Mixer selection is based on a number of factors but primarily viscosity profile and shear input.



Ross High Shear Mixers and Multi-Shaft Mixers

Food and pharmaceutical manufacturers rely on a range of high speed mixers to accomplish emulsification. In the processing of fish oil supplements, for instance, High Shear Mixers are used to prepare emulsions under 10,000 centipoise (cP). The basic single-stage design features a four-blade rotor turning at tip speeds around 3,000-4,000 ft/min within a close tolerance fixed stator. It imparts mechanical and hydraulic shear by continuously drawing product into the rotor and expelling it radially at high velocity through the openings in the stator. This type of mixer is available in both batch and inline (continuous) configurations.

Formulations that undergo viscosity changes peaking well over 10,000 cP are more efficiently batched in Multi-Shaft Mixers. These versatile machines are equipped with two or more independently-driven agitators working in tandem to deliver a combination of high shear agitation and laminar bulk flow. A Triple-Shaft Mixer featuring a low-speed anchor, rotor/stator assembly and saw-tooth disperser blade is particularly ideal for creating thickened emulsions. The agitators can be engaged in any combination and at any speed for any interval during the mixing cycle. Adjustable scrapers attached to the wings of the anchor agitator physically contact the vessel bottom and sidewalls. This allows for tighter temperature control in addition to enhanced product turnover. The saw-tooth disperser generates a vortex in the liquid surface for quick incorporation of solid ingredients and, along with the anchor, continues to agitate the batch when it becomes too thick to flow through the rotor/stator.

Ross supplies a full range of mixing equipment to the Food & Pharmaceutical Industries:

- High Speed Dispersers
- High Viscosity Dispersers
- High Shear Mixers
- Ribbon Blenders
- Paddle Blenders
- Vertical Blenders
- Tumble Blenders
- Multi-Shaft Mixers
- Vacuum Homogenizers
- Double Planetary Mixers
- Planetary Dispersers
- Discharge Systems
- Kneader Extruders
- Static Mixers
- Three Roll Mills
- Control Systems
- Storage Tanks
- Pressure Vessels
- Reactors

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Ross Ultra-High Shear Mixers

More challenging fish oil emulsions generally require agitation at greater shear levels to achieve stability. When conventional rotor/stator devices fall short in producing the desired droplet size distribution, the next practical step is to utilize an Ultra-High Shear Mixer. Several designs are available including the Ross X-Series (US Patent No. 5,632,596), a unique inline rotor/stator engineered to run at tip speeds over 11,000 ft/min. It consists of concentric rows of intermeshing teeth; product enters at the center and moves outward through multiple channels. The extremely close tolerance between adjacent surfaces of the X-Series rotor and stator is adjustable for fine-tuning shear levels and flow rates. In many formulations, this Ultra-High Shear Mixer is proven to replace expensive colloid mills and high pressure homogenizers while producing better quality emulsions at much higher throughputs and requiring simpler maintenance.

